Center Innovation Fund: JSC CIF

Graphitic Carbon Foam Structural Cores and Multifunctional Applications

Completed Technology Project (2013 - 2013)

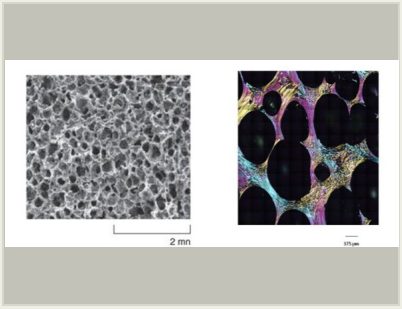
Project Introduction

Graphitic carbon foams include a family of material forms and products with mechanical, thermal, and electrical properties that are tailor-able over a wide range. They also have high temperature capability, fluid compatibility, and corrosion resistance in select extreme environments, rendering them an enabling materials technology for giant leaps in performance of exploration hardware as well as terrestrial applications. Originally investigated and produced for structural applications, graphitic carbon foams with high thermal conductivity have been implemented in thermal management applications, especially cooling for electronics and smoothing of pulse-power resistive heating. By integrating the graphitic foams into the structural core of multifunctional composites through innovative design for manufacturing processes, next-level performance gains may be realized and double-digit mass savings percentages achieved.

Project will procure available graphite foam products in small quantities, perform testing, and build simple prototype designs. Several specific applications have been identified in thermal management systems, energy storage, and multifunctional structures that will require continued collaborative engineering between divisions to develop. Working groups are being established to pursue small efforts in each area. Materials processing on as-received foams to enable engineering designs as well as techniques to produce foams with specific desirable properties are being studied.

Anticipated Benefits

Improved performance and reduced mass of Multi-Mission Exploration Vehicle. Improved safety and cycle-life of energy storage systems for ISS and Advanced Exploration Systems.



Project Image Graphitic Carbon Foam Structural Cores and Multifunctional Applications

Table of Contents

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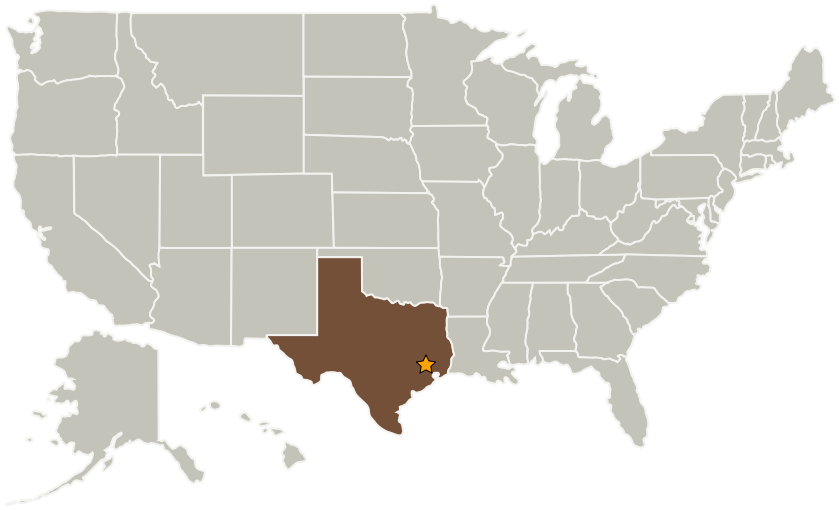
Completed Technology Project (2013 - 2013)

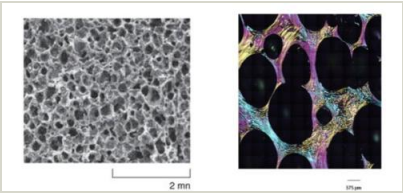
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations
Texas

Images



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Project Image Graphitic Carbon Foam Structural Cores and Multifunctional Applications
(https://techport.nasa.gov/image/2228)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Center / Facility:
Johnson Space Center (JSC)

Responsible Program:
Center Innovation Fund: JSC CIF

Project Management

Program Director:
Michael R Lapointe

Program Manager:
Carlos H Westhelle

Project Manager:
Charles S Hill

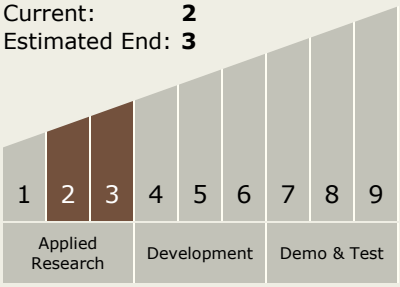
Principal Investigator:
Charles S Hill

Graphitic Carbon Foam Structural Cores and Multifunctional Applications

Completed Technology Project (2013 - 2013)

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.3 Thermal Protection Components and Systems
    - TX14.3.1 Thermal Protection Materials